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SPECIFICATIONS OF SIGNALLING SYSTEM No. 6

**INTERWORKING BETWEEN CCITT
SIGNALLING SYSTEM No. 6 AND NATIONAL
COMMON CHANNEL SIGNALLING SYSTEMS**

ITU-T Recommendation Q.300

(Extract from the *Blue Book*)

NOTES

1 ITU-T Recommendation Q.300 was published in Fascicle VI.3 of the *Blue Book*. This file is an extract from the *Blue Book*. While the presentation and layout of the text might be slightly different from the *Blue Book* version, the contents of the file are identical to the *Blue Book* version and copyright conditions remain unchanged (see below).

2 In this Recommendation, the expression “Administration” is used for conciseness to indicate both a telecommunication administration and a recognized operating agency.

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Recommendation Q.300

INTERWORKING BETWEEN CCITT SIGNALLING SYSTEM No. 6 AND NATIONAL COMMON CHANNEL SIGNALLING SYSTEMS

1 Introduction

This Recommendation deals with the philosophy that can provide for simplification of interworking between the CCITT Signalling System No. 6 employed in the international network and national common channel signalling systems for use in national networks. Three categories of such national signalling systems can be identified and are:

- i) Signalling System No. 6;
- ii) signalling system(s) derived from Signalling System No. 6;
- iii) other common channel signalling systems.

These are defined in § 3.2 below.

Through the aim of simplification, optimal operating conditions for the overall network are envisaged and thus an economic, high quality of service can be achieved. This is a matter for which all countries are interdependent.

The rapid introduction at all levels in the hierarchy of national networks can be advantageous in order to make full use of additional services and facilities of common channel signalling systems from the beginning and to facilitate the interworking problem.

2 Definitions of items concerning general principles

2.1 signalling interworking

Signalling interworking is the controlled transfer of signalling information across the interface between signalling systems where the significance of the transferred information is identical or where the significance is translated in a defined manner.

2.2 commonality

The degree to which the basic features employed in two systems are identical.

2.3 transparency

A transparent state may be said to exist between two defined points when a signal which exists at one point can be transmitted to the second point without any loss or change of information. Signal is understood here in the sense the word has in signalling systems, i.e. a piece or item of information with a standardized meaning.

Transparency of the network of signalling channels would ensure that transfer of signalling information from one link to another is always achieved on a signal-per-signal basis. Thus, laborious analysis of several received signals for deciding which signal to transmit could be avoided.

Transparency is facilitated by the use of Signalling System No. 6 or a system derived from Signalling System No. 6, in national networks.

2.4 compatibility

Compatibility with respect to interworking implies a degree of transparency sufficient to support an acceptable grade of service with respect to a connection which transits the interworking office. Full compatibility implies full transparency.

2.5 **basic features**

The essential prime constituent characteristics on which a system is founded.

3 **Items concerning signalling systems and interworking points**

3.1 *Signalling System No. 6*

The specifications of System No. 6 are contained in Recommendations Q.251 to Q.295.

3.2 *National common channel signalling systems*

National common channel signalling systems may be used in:

- a) analogue networks;
- b) mixed analogue and digital networks;
- c) digital networks with or without service integration.

In national networks the following¹⁾ national common channel signalling systems may be used:

1) Signalling System No. 6

Even when the signal units reserved for regional and/or national use are allocated in a different manner by various Administrations it is justified to consider this signalling system as Signalling System No. 6.

2) Signalling system(s) derived from Signalling System No. 6

A signalling system is considered to be derived²⁾ from Signalling System No. 6 when typical basic features of Signalling System No. 6 are employed:

The following are typical basic features of Signalling System No. 6:

- a) separate common signalling channel,
 - b) all inter-office signal transmission through the common signalling channel,
 - c) signal transfer on a link-by-link basis,
 - d) full duplex signal unit synchronous mode of transmission,
 - e) fixed signal unit length and block size,
 - f) error detection by check bits and error correction by retransmission,
 - g) continuity check on per-call basis,
 - h) quasi-associated signalling capability,
 - i) security arrangements for signalling channel,
- #### 3) Other common channel signalling system(s)

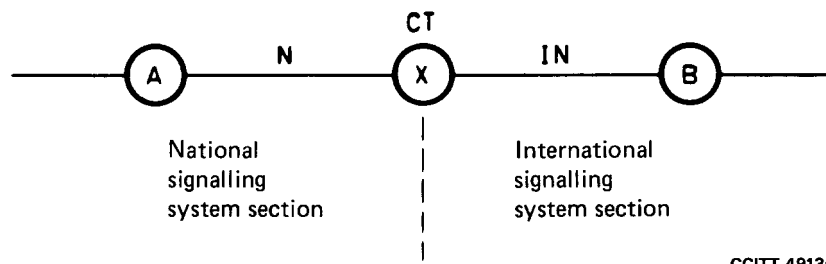
Although some similarity with Signalling System No. 6 may exist, basic features differ from the Signalling System No. 6 concept.

3.3 *Interworking point*

In Figure 1/Q.300, a signalling system *N* between exchanges *A* and *X* is a national common channel signalling system, while a system *IN* between exchanges *X* and *B* is System No. 6. All necessary interworking arrangements should be provided at exchange *X* (CT); thus interworking point is *X*.

¹⁾ With regard to the order of the systems mentioned no preference is expressed.

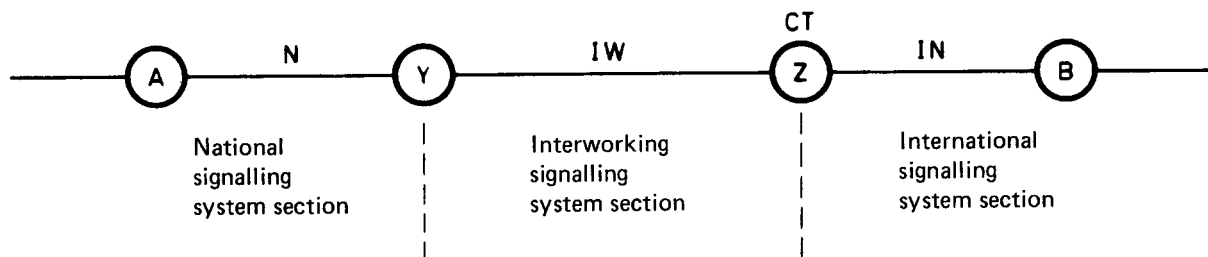
²⁾ Use of this expression is recommended instead of the term *based in Signalling System No. 6* in order to avoid ambiguity.



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FIGURE 1/Q.300
Interworking point, example 1

In Figure 2/Q.300, a signalling system *N* between exchanges *A* and *Y* is a national common channel signalling system, while a signalling system *IN* between exchanges *Z* and *B* is System No. 6.



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FIGURE 2/Q.300
Interworking point, example 2

Signalling system *IW* applicable to the section between exchanges *Y* and *Z* (CT) can be any of

- 1) Signalling System No. 6,
- 2) national common channel signalling system,
- 3) signalling system for interworking use.

The interworking point is exchange *Y* for 1), and *Z* for 2). On the other hand, in the case of 3), the necessary interworking arrangement can be shared between exchanges *Y* and *Z*. interworking point in this case is divided into two sub-interworking points, i.e. national side sub-interworking point (exchange *Y*) and international side sub-interworking point (exchange *Z*).

4 Signalling procedures

4.1 Translation of signalling information

It is to be expected that in the future the long-distance network in many areas will be a mesh network of high density. Intensive use of transversal routes can be foreseen which in many cases will be operated with common channel signalling in the non-associated mode. Essentially, then, an overall signalling channel network will exist representing a link-by-link message switching system with messages and transfer procedures between different links due to the various national common channel signalling systems. In the nodes of that network, signal processing will be carried out, thereby including necessary signal translation operations if different common channel signalling systems are joining at the particular point.

Signal translation, however, may entail laborious processing procedures which require costly computer time likely to increase in proportion to telephone traffic. Evidently, it is desirable to reduce to a minimum such additional processing, which also may introduce faults.

Interworking is simplified if:

- supervisory signals have exactly the same meaning and the same function in both systems;
- the address information is sent in the same sequence in both systems;
- address-complete signal or its equivalent is used in the national system.

4.2 *Signal conversions and originations*

Some electrical signals in a national common channel signalling system may differ from the signals in the System No. 6. The international exchange or the national trunk exchange must convert such signals into corresponding signals according to the predetermined conversion table.

In order to provide for proper interworking between Signalling System No. 6 and national common channel signalling systems it is essential that a common channel exchange in the national network originates and sends on each connection one of the signals: address-complete, address-incomplete, congestion or called party's line condition. See also §§ 4.1.5 through 4.1.8 of Recommendation Q.261.

It is desired that some backward signals of System No. 6, which indicate conditions of an incoming national network or called subscribers, be converted, as directly as possible, into corresponding signals in the outgoing national network. If direct conversion is not possible, at least signals of the following two categories should be converted into relevant appropriate audible tones or recorded announcements at some appropriate interworking point:

- 1) In order to request that the calling subscriber re-dial:
 - switching-equipment-congestion signal (SEC)
 - circuit-group-congestion signal (CGC)
 - national-network-congestion signal (NNC)
 - subscriber-busy signal (SSB)
- 2) In order to send the information that the dialled telephone number is not available:
 - address-incomplete signal (ADI)
 - unallocated-number signal (UNN)
 - line-out-of-service signal (LOS)
 - subscriber-transferred signal (SST)

4.3 *Continuity check*

When no continuity check or a different continuity check from that in System No. 6 is applied in the national network, the transit exchange at the interworking point must be able to deal with both methods,

In a national network, a continuity check method differing from that of System No. 6 is necessary for the checking of two-wire circuits or circuits switched in two-wire exchanges.

An example of continuity check method for national use is as follows:

End-to-End continuity check facilities are provided on a pre-call basis between the first common channel signalling exchange and the last common channel signalling exchange. Two different tones (f_1 and f_2) are used for the checking.

The first exchange, on receipt of the backward tone f_2 from the last exchange, sends the tone f_1 forward. When the exchange detects the tone sent from the first exchange, the continuity check is successfully accomplished and Check-OK is sent backward to the first exchange to inform that the check was successful.

Another example employs link-by-link continuity check facilities on a per-call basis between the first common channel signalling exchange and the next common channel signalling exchange where the first exchange employs two-wire switching. Again, two frequencies f_1 and f_2 are employed, one in each direction of transmission and if a successful continuity check is achieved a continuity signal is transmitted. A similar check would be used between the next to last and the last common channel signalling exchanges.

4.4 *Signals for national use*

Interworking of common channel signalling systems may require certain extra common channel signals which may be used exclusively in a national common channel signalling system.

A possible example is given below:

In order to avoid ineffective occupation of international circuits by unsuccessful calls, it is desired to send back relevant electrical signals to the preceding exchanges indicating that the call has not succeeded so that the connection may be cleared and an appropriate tone connected as close as possible to the calling subscriber.

When a national common channel signalling system is interworking with existing national signalling and switching systems, however, appropriate backward electrical signals that can indicate non-success of a call (e.g. national-network-congestion, etc.) may not always be available, and indications may be restricted to audible tones. In this case, an extra interworking signal, say *non-common-channel-connected* signal, may be provided. Such a signal would request the incoming interworking exchange to withhold the address-complete signal for a certain period of time so as to permit the audible tone sent back from beyond the last exchange of the national common channel signalling section to be received and converted into an appropriate electrical signal.